

C L A I M S

1. A spectacle lens evaluation method

characterized by executing:

the measurement step of, when a first surface of a target lens is irradiated with light, measuring optical paths of exit light beams emerging from a plurality of measurement points on a second surface on an opposite side;

the target lens dioptric power distribution calculation step of calculating a dioptric power distribution of the target lens on the basis of the measurement result;

the design lens spatial model construction step of constructing a design lens spatial model imitating optical characteristics of the target lens on the basis of design values registered in advance;

the light exit position calculation step of calculating a light exit position on a first surface of the design lens spatial model, assuming that light directly opposite to the exit light having undergone optical path measurement is incident at the same position as the measurement point on a second surface of the design lens spatial model;

the exit light optical path calculation step of calculating optical paths of exit light beams emerging from a plurality of measurement points on the second surface of the design lens spatial model,

27 assuming that the same light as that in the measurement
28 step is applied at the calculated light exit position of
29 the design lens spatial model;
30 the design lens dioptric power distribution
31 calculation step of calculating a dioptric power
32 distribution of the design lens spatial model on the
33 basis of the calculated optical paths of the exit light
34 beams; and
35 the error distribution calculation step of
36 calculating an error distribution of the dioptric power
37 distribution of the target lens with respect to the
38 dioptric power distribution of the design lens spatial
39 model.

2. A spectacle lens evaluation method

2 according to claim 1, characterized in that
3 the spectacle lens evaluation method executes
4 the pass/fail determination step of determining
5 "pass"/"fail" of the target lens by collating the error
6 distribution calculated in the error distribution
7 calculation step with a preset pass/fail determination
8 condition,
9 the pass/fail determination condition is
10 constituted by determination area segmentation for
11 segmenting the target lens into a plurality of
12 determination areas, and an error allowable condition
13 set for each of the determination areas segmented in
14 accordance with the determination area segmentation, and

15 in the pass/fail determination step, the error
16 distribution is segmented into a plurality of
17 determination areas in accordance with the determination
18 area segmentation, and "fail" is determined if at least
19 one of the error distributions segmented as the
20 plurality of determination areas does not satisfy the
21 error allowable condition.

 3. A spectacle lens evaluation method
2 according to claim 2, characterized in that
3 the error allowable condition is constituted
4 by a dioptric power allowable error set for each
5 determination area, and an allowable ratio obtained by
6 setting, for each determination area, an allowance for a
7 ratio of the number of measurement points at which the
8 allowable error is not satisfied to the total number of
9 measurement points in the determination area, and
10 in the pass/fail determination step, a ratio
11 of the number of measurement points at which the
12 allowable error is not satisfied is calculated for each
13 determination area, and "fail" is determined if at least
14 one of the ratios calculated for the respective
15 determination areas does not satisfy the allowable
16 ratio.

 4. A spectacle lens evaluation method
2 according to claim 2, characterized in that the stricter
3 error allowable conditions are set for determination
4 areas closer to an optical center of the target lens.

5. A spectacle lens evaluation method
2 according to claim 2, characterized in that the stricter
3 error allowable conditions are set for determination
4 areas closer to distance and near portions of the target
5 lens.

6. A spectacle lens evaluation method
2 according to claim 2, characterized in that in the
3 pass/fail determination step, only a frame area
4 specified by frame shape data of the target lens is set
5 as the determination area, and a portion located outside
6 the frame area of the target lens is excluded from the
7 pass/fail determination.

7. A spectacle lens evaluation apparatus
2 characterized by comprising:
3 a dioptric power distribution measuring device
4 which, when a first surface of a target lens is
5 irradiated with light, measures optical paths of exit
6 light beams emerging from a plurality of measurement
7 points on a second surface on an opposite side, and
8 calculates a dioptric power distribution of the target
9 lens on the basis of the measurement result;
10 storage means for storing design values for
11 the target lens;
12 design lens spatial model construction means
13 for constructing a design lens spatial model imitating
14 optical characteristics of the target lens on the basis
15 of the design values;

16 light exit position calculation means for
17 calculating a light exit position on a first surface of
18 the design lens spatial model, assuming that light
19 directly opposite to the exit light having undergone
20 optical path measurement is incident at the same
21 position as the measurement point on a second surface of
22 the design lens spatial model;

23 exit light optical path calculation means for
24 calculating optical paths of exit light beams emerging
25 from a plurality of measurement points on the second
26 surface of the design lens spatial model, assuming that
27 the same light as that in measurement by said dioptric
28 power distribution measuring device is applied at the
29 calculated light exit position of the design lens
30 spatial model;

31 design lens dioptric power distribution
32 calculation means for calculating a dioptric power
33 distribution of the design lens spatial model on the
34 basis of the calculated optical paths of the exit light
35 beams; and

36 error distribution calculation means for
37 calculating an error distribution of the dioptric power
38 distribution of the target lens with respect to the
39 dioptric power distribution of the design lens spatial
40 model.

 8. A spectacle lens evaluation apparatus
2 according to claim 7, characterized in that

3 said spectacle lens evaluation apparatus
4 comprises
5 pass/fail determination condition storage
6 means for storing a pass/fail determination condition
7 constituted by determination area segmentation for
8 segmenting the target lens into a plurality of
9 determination areas, and an error allowable condition
10 set for each of the determination areas segmented in
11 accordance with the determination area segmentation, and
12 pass/fail determination means for determining
13 "pass"/"fail" of the target lens by collating the error
14 distribution calculated by said error distribution
15 calculation means with the pass/fail determination
16 condition, and
17 said pass/fail determination means segments
18 the error distribution into a plurality of determination
19 areas in accordance with the determination area
20 segmentation, and determines "fail" if at least one of
21 the error distributions segmented as the plurality of
22 determination areas does not satisfy the error allowable
23 condition.

9. A spectacle lens evaluation apparatus
2 according to claim 8, characterized in that
3 the error allowable condition is constituted
4 by a dioptric power allowable error set for each
5 determination area, and an allowable ratio obtained by
6 setting, for each determination area, an allowance for a

7 ratio of the number of measurement points at which the
8 allowable error is not satisfied to the total number of
9 measurement points in the determination area, and
10 said pass/fail determination means calculates
11 a ratio of the number of measurement points at which the
12 allowable error is not satisfied for each determination
13 area, and determines "fail" if at least one of the
14 ratios calculated for the respective determination areas
15 does not satisfy the allowable ratio.

10. A spectacle lens evaluation apparatus
2 according to claim 8, characterized in that the stricter
3 error allowable conditions are set for determination
4 areas closer to an optical center of the target lens.

11. A spectacle lens evaluation apparatus
2 according to claim 8, characterized in that the stricter
3 error allowable conditions are set for determination
4 areas closer to distance and near portions of the target
5 lens.

12. A spectacle lens evaluation apparatus
2 according to claim 8, characterized in that said
3 pass/fail determination means sets only a frame area
4 specified by frame shape data of the target lens as the
5 determination area, and excludes a portion located
6 outside the frame area of the target lens from the
7 pass/fail determination.

13. A spectacle lens manufacturing method of
2 manufacturing a spectacle lens on the basis of order

3 data from a spectacle lens orderer side, characterized
4 by comprising:
5 cutting/polishing a lens on the basis of the
6 order data;
7 when a first surface of the cut/polished lens
8 is irradiated with light, measuring optical paths of
9 exit light beams emerging from a plurality of
10 measurement points on a second surface on an opposite
11 side, and calculating a dioptric power distribution of
12 the ordered lens on the basis of the measurement result;
13 calculating a design lens dioptric power
14 distribution from design values for the ordered lens
15 based on the order data; and
16 evaluating the lens by calculating an error
17 distribution of an actual dioptric power distribution
18 with respect to the design lens dioptric power
19 distribution.

14. A spectacle lens manufacturing system
2 characterized by comprising:
3 a computer placed on a spectacle lens orderer
4 side;
5 a manufacturer side computer which is so
6 connected to receive order data sent from said orderer
7 side computer;
8 storage means for storing design values for an
9 ordered lens based on the order data;
10 a dioptric power distribution measuring device

11 which, when a first surface of an ordered lens
12 manufactured on the order data is irradiated with light,
13 measures optical paths of exit light beams emerging from
14 a plurality of measurement points on a second surface on
15 an opposite side, and calculates a dioptric power
16 distribution of the ordered lens on the basis of the
17 measurement result;

18 design lens dioptric power distribution
19 calculation means for calculating a dioptric power
20 distribution on the basis of the design values; and
21 error distribution calculation means for
22 calculating an error distribution of the dioptric power
23 distribution measured by said dioptric power
24 distribution measuring device with respect to the
25 dioptric power distribution calculated by said design
26 lens dioptric power distribution calculation means.

15. A spectacle lens manufacturing method of
2 manufacturing a plurality of spectacle lenses with the
3 same specifications, characterized by comprising:

4 molding a lens on the basis of manufacturing
5 instruction data representing specifications of a lens
6 to be manufactured;

7 when a first surface of the molded lens is
8 irradiated with light, measuring optical paths of exit
9 light beams emerging from a plurality of measurement
10 points on a second surface on an opposite side, and
11 calculating a dioptric power distribution of the lens on

12 the basis of the measurement result;
13 calculating a design lens dioptric power
14 distribution from design values for the lens based on
15 the manufacturing instruction data; and
16 calculating an actual error distribution of a
17 dioptric power distribution which corresponds the design
18 lens dioptric power distribution, thus evaluating the
19 lens.

16. A spectacle lens manufacturing system for
2 manufacturing a plurality of spectacle lenses with the
3 same specifications, characterized by comprising:
4 a computer which inputs manufacturing
5 instruction data representing specifications of a lens
6 to be manufactured;
7 storage means for storing design values for a
8 lens based on the manufacturing instruction data;
9 a dioptric power distribution measuring device
10 which, when a first surface of a lens manufactured on
11 the basis of the manufacturing instruction data is
12 irradiated with light, measures optical paths of exit
13 light beams emerging from a plurality of measurement
14 points on a second surface on an opposite side, and
15 calculates a dioptric power distribution of the lens on
16 the basis of the measurement result;
17 design lens dioptric power distribution
18 calculation means for calculating a dioptric power
19 distribution on the basis of the design values; and

20 error distribution calculation means for
21 calculating an error distribution of the dioptric power
22 distribution measured by said dioptric power
23 distribution measuring device with respect to the
24 dioptric power distribution calculated by said design
25 lens dioptric power distribution calculation means.

17. An evaluation method for a lens-like mold
2 used for spectacle lens molding, characterized by
3 executing:

4 the measurement step of, when a first surface
5 of a target mold is irradiated with light, measuring
6 optical paths of exit light beams emerging from a
7 plurality of measurement points on a second surface on
8 an opposite side;

9 the target mold dioptric power distribution
10 calculation step of calculating a dioptric power
11 distribution of the target mold on the basis of the
12 measurement result;

13 the design mold spatial model construction
14 step of constructing a design mold spatial model
15 imitating optical characteristics of the target mold on
16 the basis of design values registered in advance;

17 the light exit position calculation step of
18 calculating a light exit position on a first surface of
19 the design mold spatial model, assuming that light
20 directly opposite to the exit light having undergone
21 optical path measurement is incident at the same

22 position as the measurement point on a second surface of
23 the design mold spatial model;
24 the exit light optical path calculation step
25 of calculating optical paths of exit light beams
26 emerging from a plurality of measurement points on the
27 second surface of the design mold spatial model,
28 assuming that the same light as that in the measurement
29 step is applied at the calculated light exit position of
30 the design mold spatial model;
31 the design mold dioptric power distribution
32 calculation step of calculating a dioptric power
33 distribution of the design mold spatial model on the
34 basis of the calculated optical paths of the exit light
35 beams; and
36 the error distribution calculation step of
37 calculating an error distribution of the dioptric power
38 distribution of the target mold with respect to the
39 dioptric power distribution of the design mold spatial
40 model.

18. An evaluation apparatus for a lens-like
2 mold used for spectacle lens molding, characterized by
3 comprising:
4 a dioptric power distribution measuring device
5 which, when a first surface of a target mold is
6 irradiated with light, measures optical paths of exit
7 light beams emerging from a plurality of measurement
8 points on a second surface on an opposite side, and

9 calculates a dioptric power distribution of the target
10 mold on the basis of the measurement result;

11 storage means for storing design values for
12 the target mold;

13 design mold spatial model construction means
14 for constructing a design mold spatial model imitating
15 optical characteristics of the target mold on the basis
16 of the design values;

17 light exit position calculation means for
18 calculating a light exit position on a first surface of
19 the design mold spatial model, assuming that light
20 directly opposite to the exit light having undergone
21 optical path measurement is incident at the same
22 position as the measurement point on a second surface of
23 the design mold spatial model;

24 exit light optical path calculation means for
25 calculating optical paths of exit light beams emerging
26 from a plurality of measurement points on the second
27 surface of the design mold spatial model, assuming that
28 the same light as that in measurement by said dioptric
29 power distribution measuring device is applied at the
30 calculated light exit position of the design mold
31 spatial model;

32 design mold dioptric power distribution
33 calculation means for calculating a dioptric power
34 distribution of the design mold spatial model on the
35 basis of the calculated optical paths of the exit light

36 beams; and
37 error distribution calculation means for
38 calculating an error distribution of the dioptric power
39 distribution of the target mold with respect to the
40 dioptric power distribution of the design mold spatial
41 model.